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Hayashi

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(54) **CLEANING DEVICE AND ELECTROPHOTOGRAPHIC IMAGE FORMING APPARATUS HAVING THE SAME**

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(73) Assignee: **SAMSUNG ELECTRONICS CO., LTD.**, Suwon-Si (KR)

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Jan. 30, 2015 (KR) 10-2015-0015585

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G03G 21/00 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 21/0011*** (2013.01); ***G03G 21/0029*** (2013.01)

(58) **Field of Classification Search**
CPC G03G 21/0029; G03G 2221/1618; G03G 2221/1648
See application file for complete search history.

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Primary Examiner — Gregory H Curran
(74) *Attorney, Agent, or Firm* — Staas & Halsey LLP

(57) **ABSTRACT**

A cleaning device configured to remove a developing agent from a photosensitive body, and an electrophotographic image forming apparatus including the cleaning device, are provided. The cleaning device includes a cleaning blade assembly including a cleaning blade configured to remove the developing agent, and a support plate configured to support the cleaning blade. The cleaning device further includes a housing portion configured to support the cleaning blade assembly. The cleaning device further includes a scattering prevention portion configured to prevent the developing agent from leaking through a gap between an end of the cleaning blade and the housing portion in a lengthwise direction, extend in the lengthwise direction over the end of the cleaning blade, and connect the cleaning blade assembly to the housing portion.

25 Claims, 16 Drawing Sheets

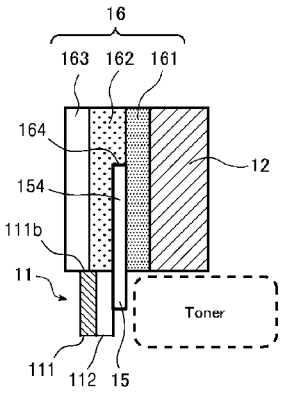


FIG. 1A

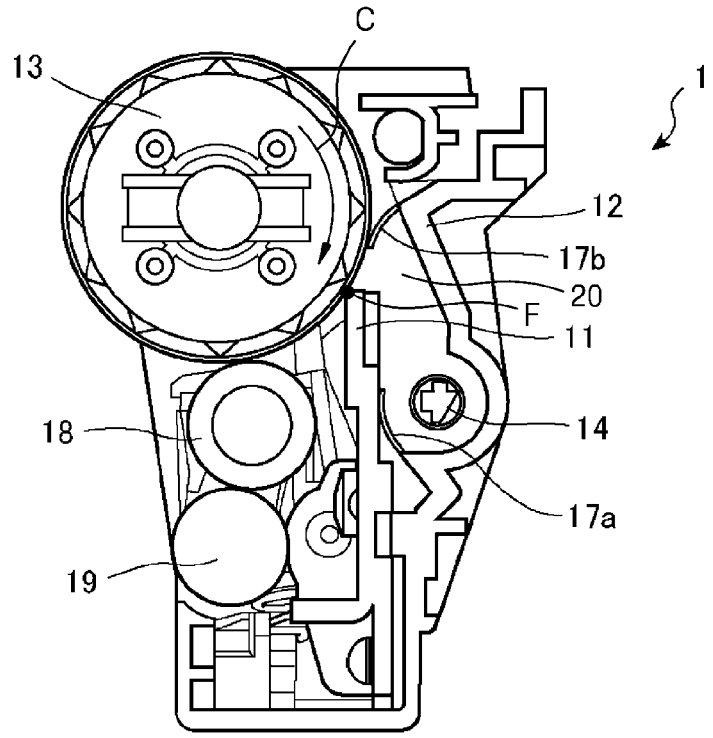
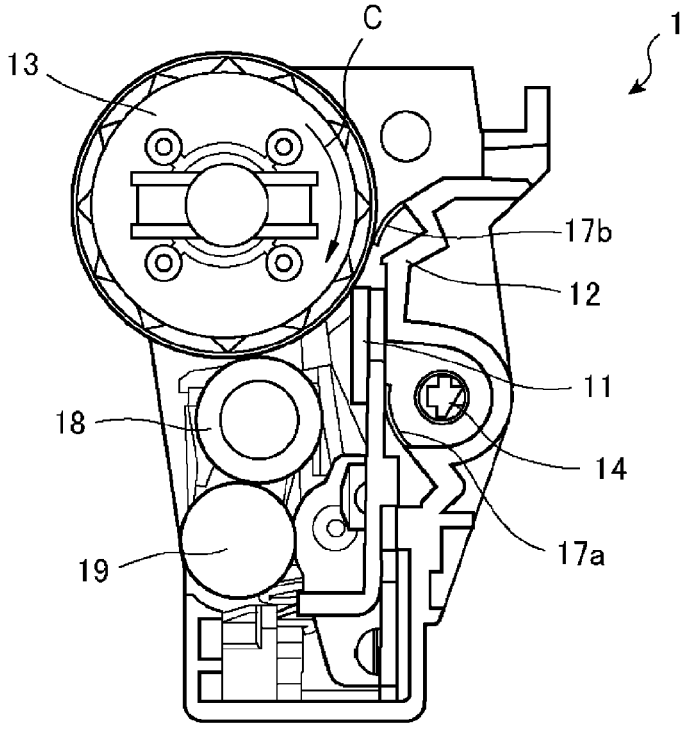


FIG. 1B



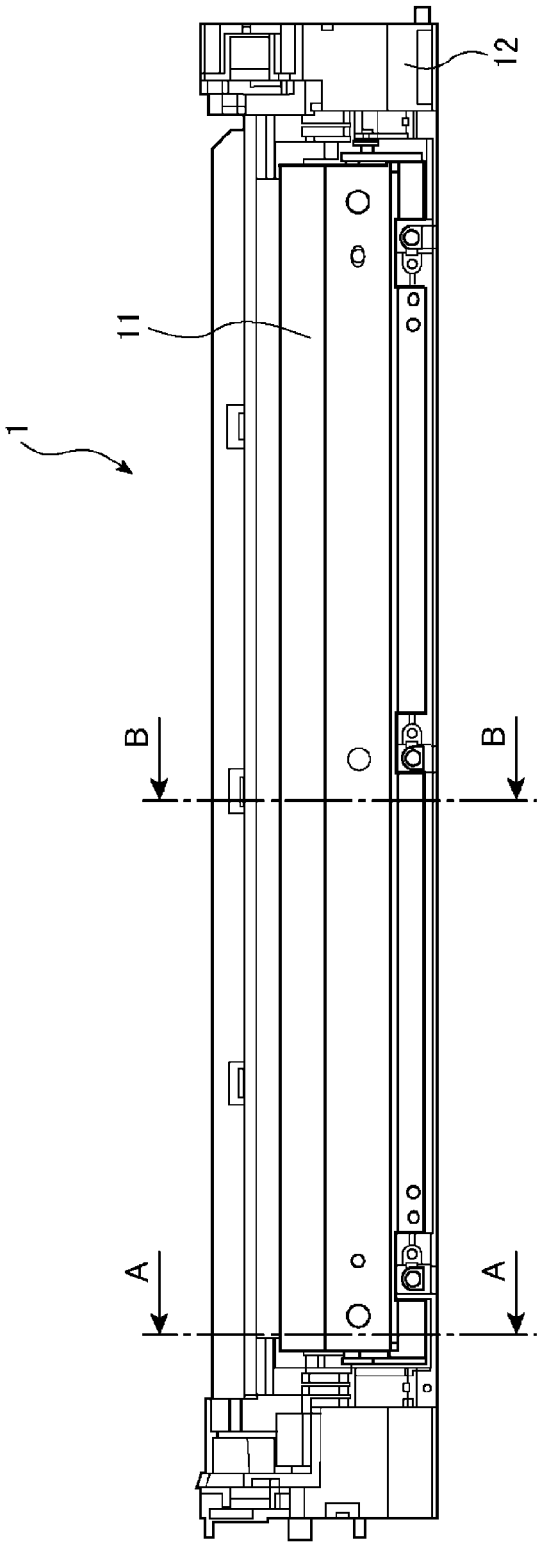


FIG. 2

FIG. 3A

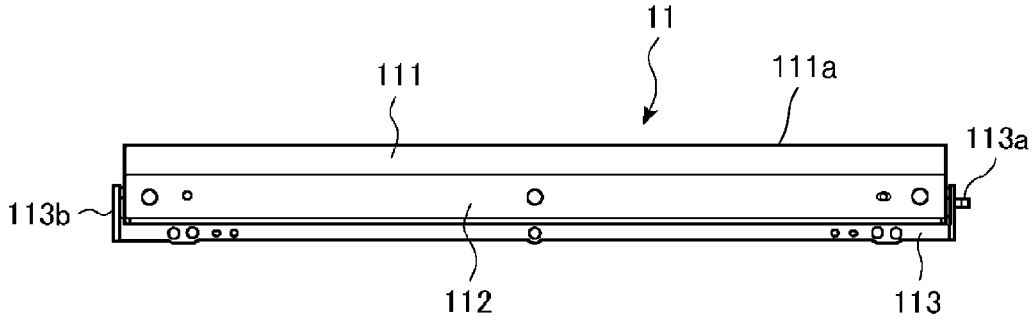


FIG. 3B

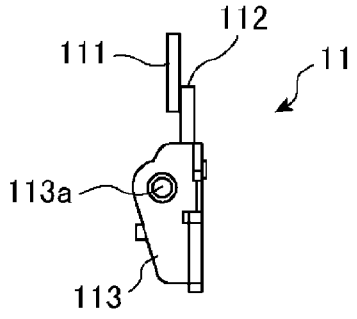


FIG. 4A

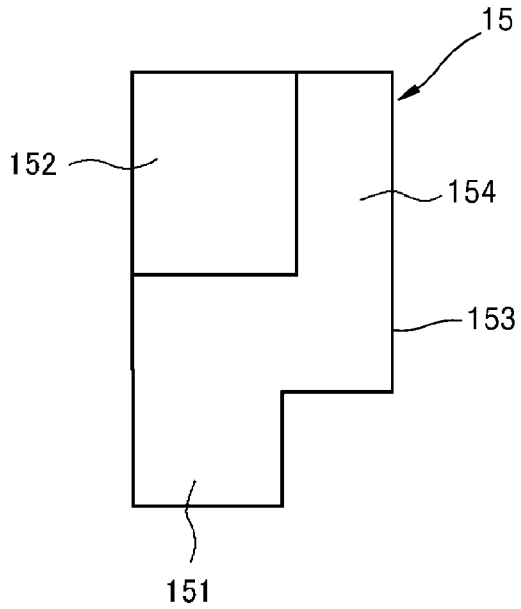


FIG. 4B

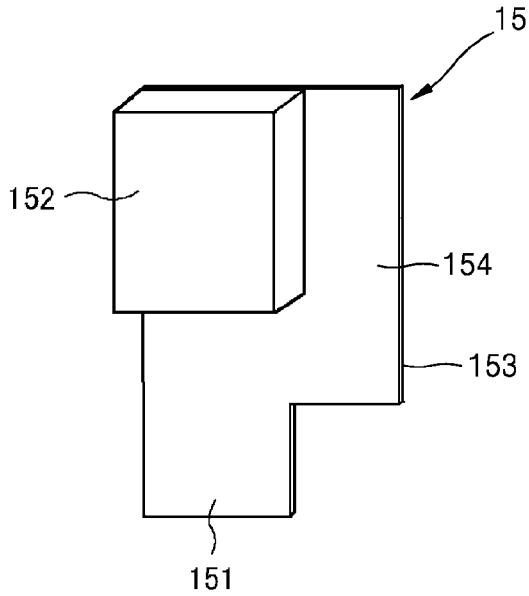
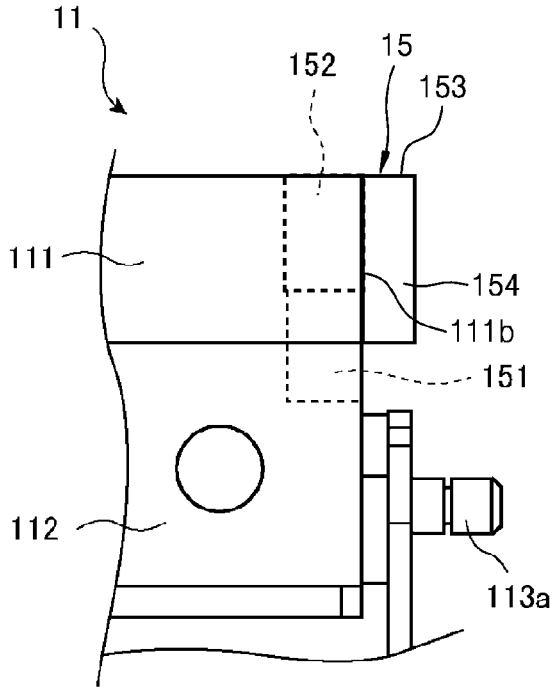


FIG. 5A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113a

FIG. 5B

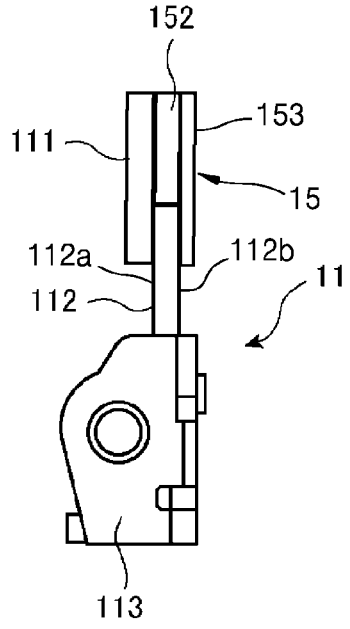
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FIG. 6

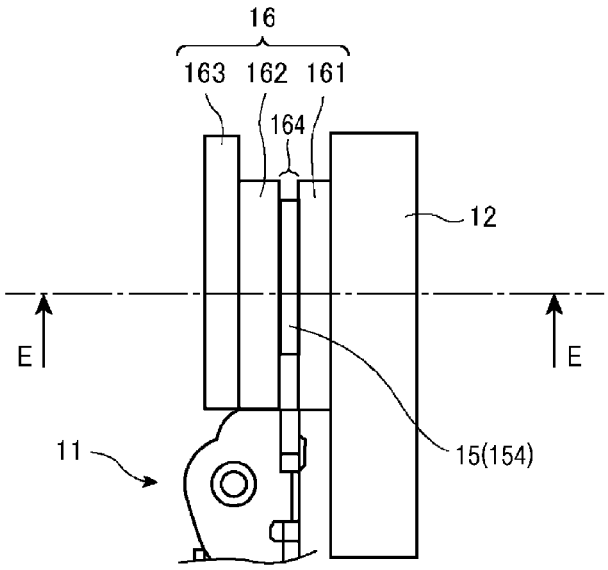

FIG. 7A

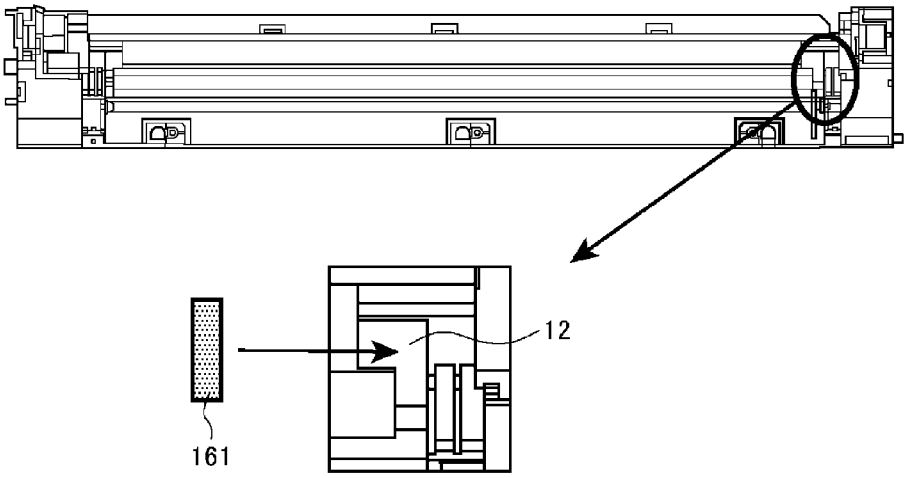

FIG. 7B

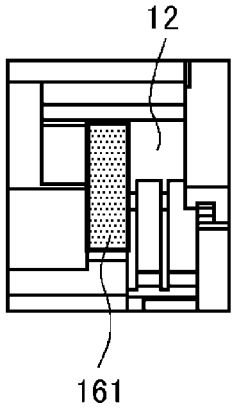

FIG. 7C

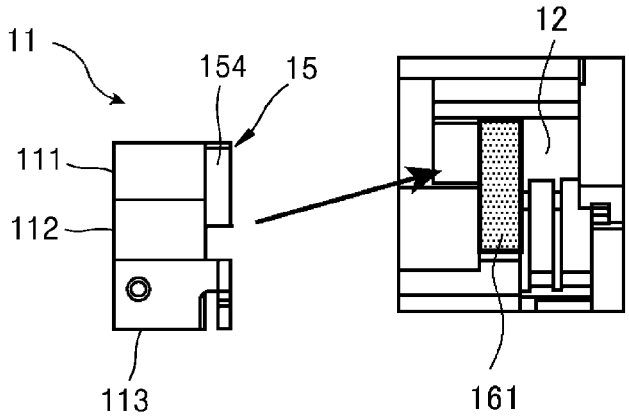

FIG. 7D

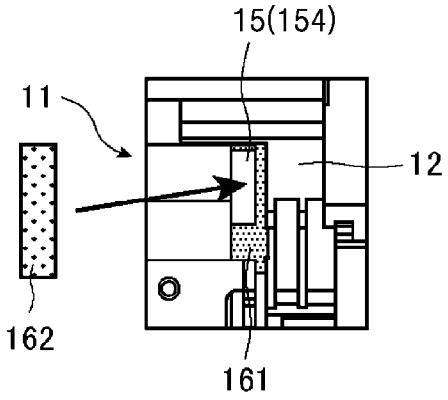

FIG. 7E

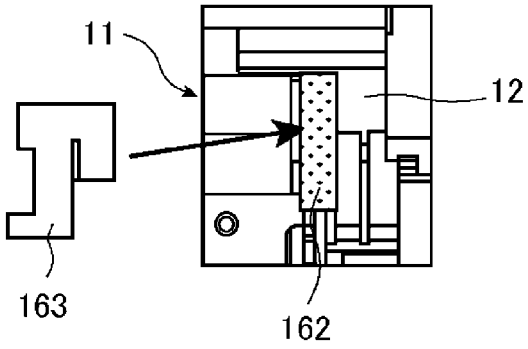

FIG. 7F

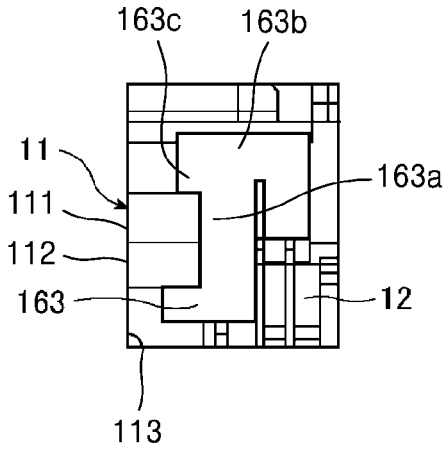

FIG. 7G

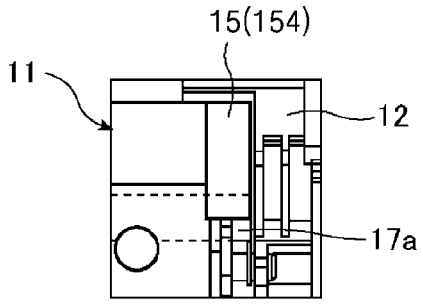
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FIG. 8A

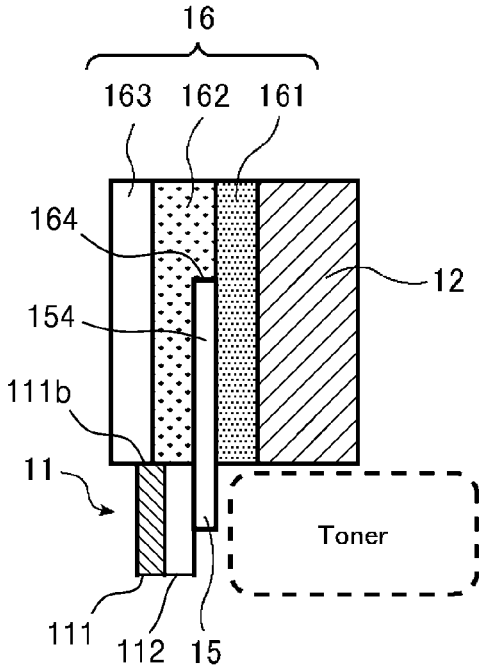
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FIG. 8B

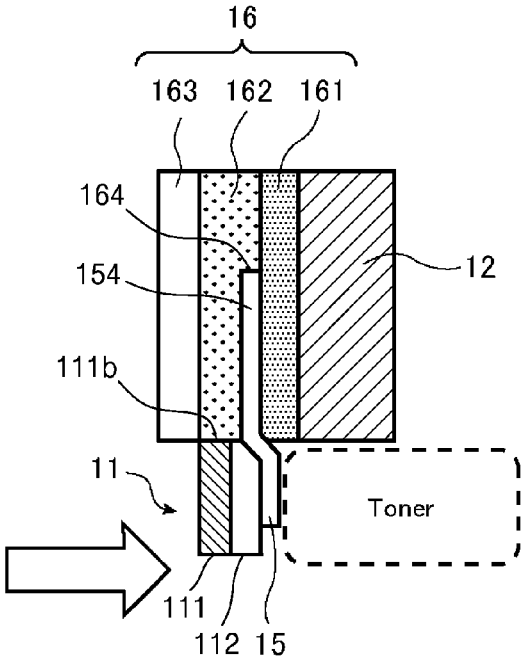
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FIG. 8C

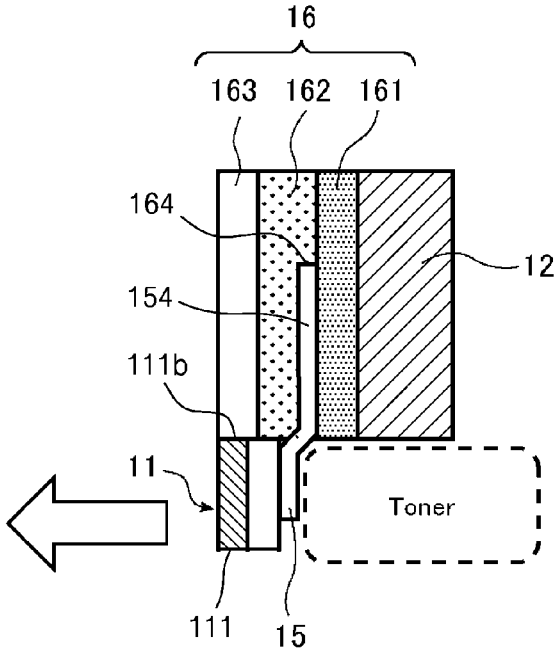
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FIG. 8D

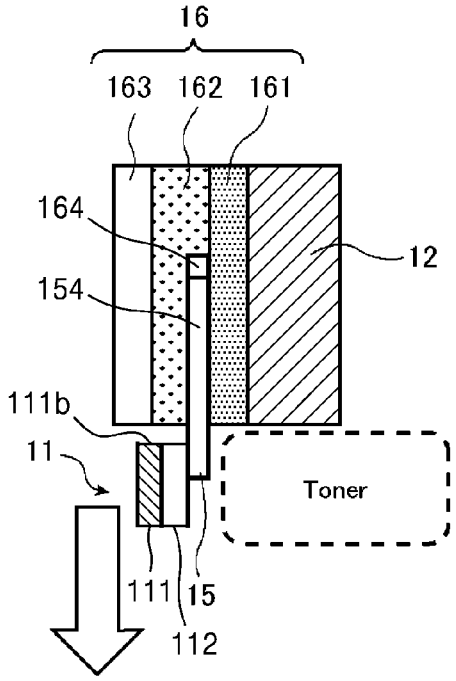
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FIG. 9

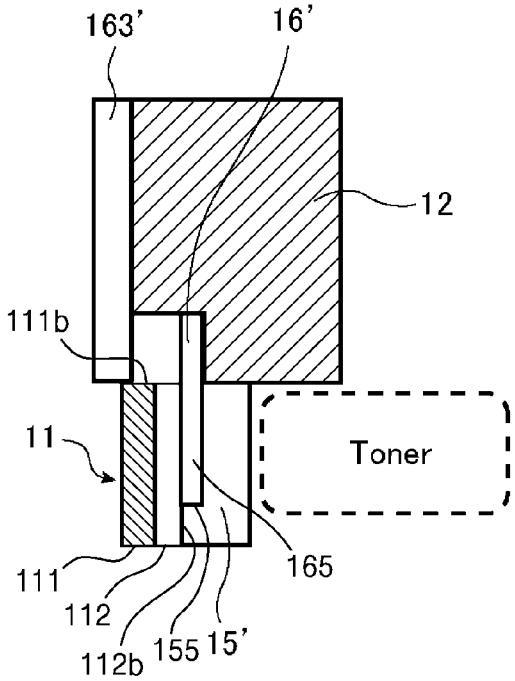
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FIG. 10

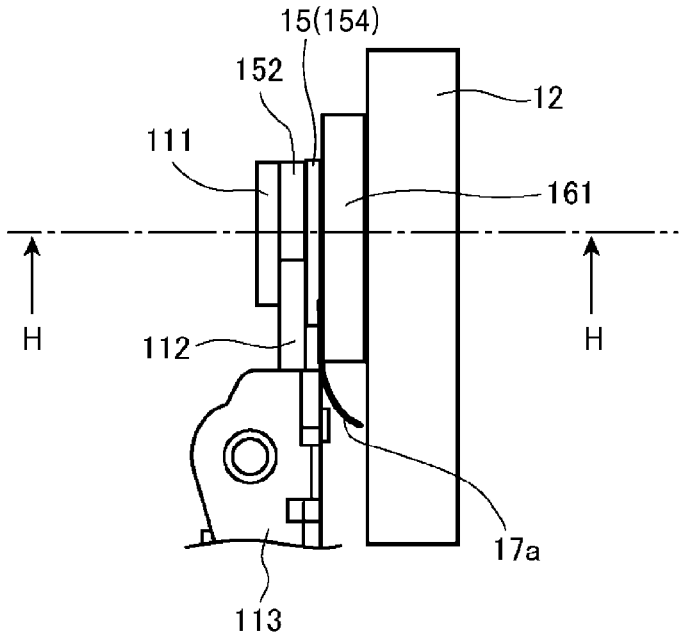


FIG. 11A

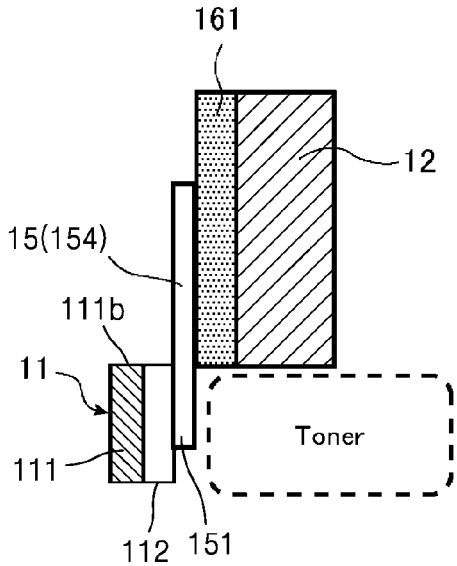


FIG. 11B

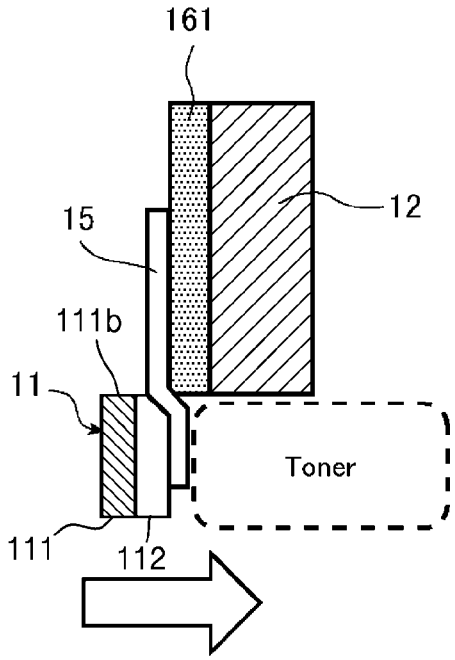


FIG. 11C

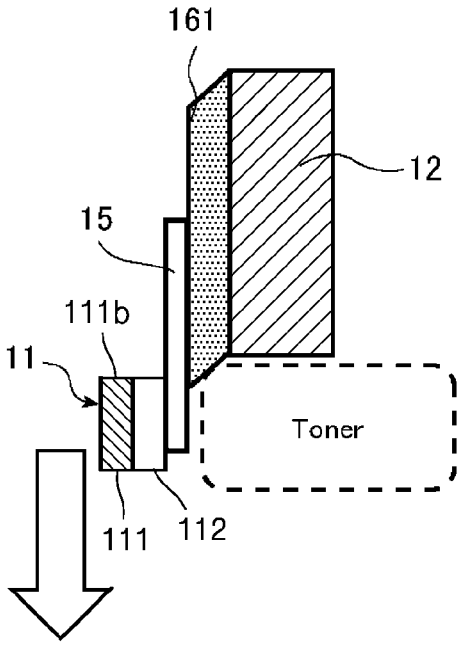


FIG. 12A (RELATED ART)

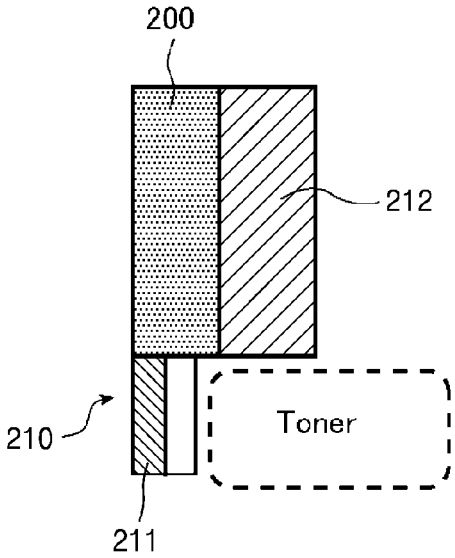


FIG. 12B (RELATED ART)

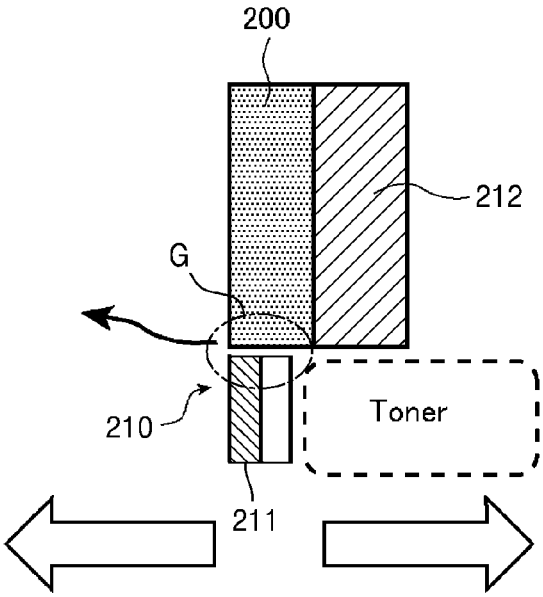


FIG. 12C (RELATED ART)

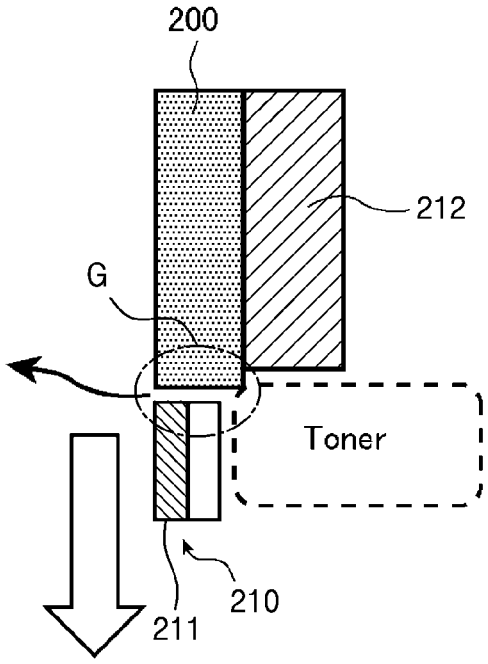
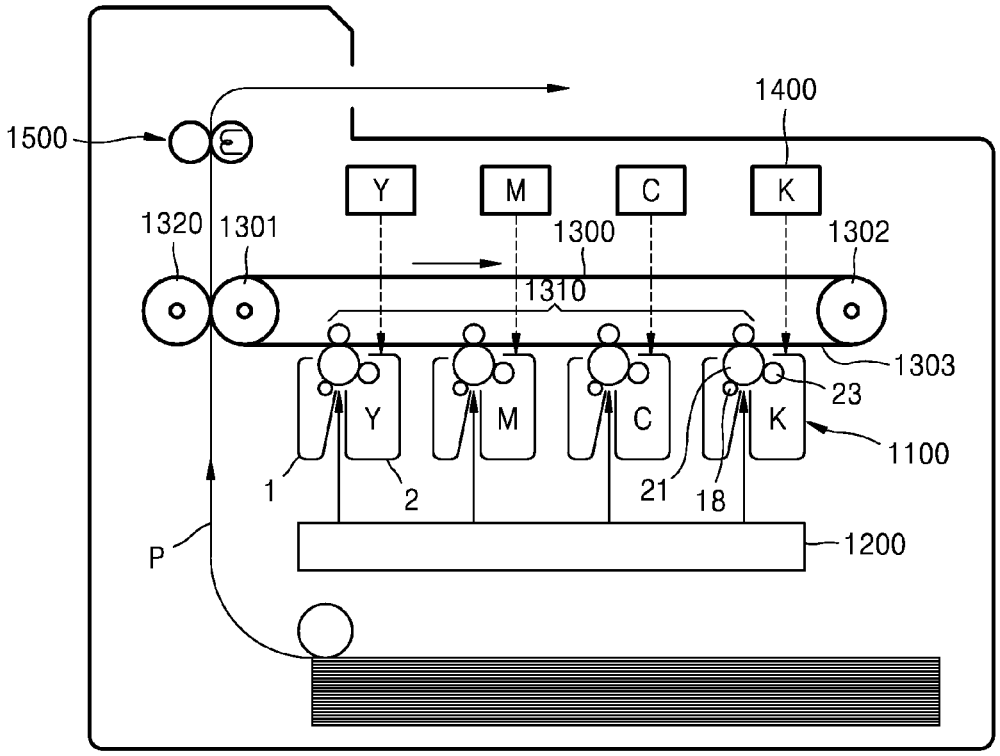


FIG. 13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CLEANING DEVICE AND ELECTROPHOTOGRAPHIC IMAGE FORMING APPARATUS HAVING THE SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority from Japanese Patent Application No. 2014-179465, filed on Sep. 3, 2014, in the Japanese Patent Office, and Korean Patent Application No. 10-2015-0015585, filed on Jan. 30, 2015, in the Korean Intellectual Property Office, the disclosures of which are incorporated herein by reference in their entireties.

BACKGROUND

1. Field

Apparatuses and methods consistent with exemplary embodiments relate to a cleaning device and an electrophotographic image forming apparatus having the cleaning device.

2. Description of the Related Art

An operation of laser printers includes a charging process of charging the entire surface of a photosensitive body, an exposure process of forming an electrostatic latent image on the photosensitive body by radiating laser beams onto the photosensitive body, a developing process of forming a visible image by attaching a developing agent to the electrostatic latent image, a transfer process of transferring the visible image onto paper, and a fusing process of fusing the visible image transferred onto the paper on the paper. In the transfer process, the whole developing agent is not transferred onto the paper, and the developing agent remains in the photosensitive body. The residual developing agent lowers printing quality of a next page, and thus needs to be removed. A cleaning device for cleaning the surface of the photosensitive body is disposed as a device for removing the residual developing agent. Also, when a two-component developing agent including carriers and toner is used as the developing agent, the toner is attached onto the photosensitive body by performing the developing process. However, a small number of carriers may be attached onto the photosensitive body. In this case, the cleaning device cleans the stuck matter. Thus, the stuck matter to be cleaned by the cleaning device is toner, and may include carriers.

A method of scratching and removing the residual developing agent on the surface of the photosensitive body using a cleaning blade configured of an elastic member, as the cleaning device, is used. The removed residual developing agent is recovered by a recovering mechanism, such as an auger screw disposed in the cleaning device. The developing agent including very small particles may float and leak into a fine gap. Because leakage of the developing agent may cause contamination or failure in an image forming apparatus, this needs to be prevented. In order to prevent the leakage of the residual developing agent, a sealing structure is employed in a needed position of the cleaning device, and sealing members are installed in both ends of the cleaning blade.

In a structure for preventing leakage of the developing agent through a space between both ends of the cleaning blade and a housing portion, a sealing member is installed between an end of the cleaning blade and the housing portion to fill a gap between both ends of the cleaning blade and the housing portion. In a structure in which lateral ends of the sealing member and lateral ends of the cleaning blade come into contact with each other, it is not easy to maintain high adhesion performance therebetween. Also, when an oscillating cleaning blade that oscillates in a direction of a diameter or an axial direction of the photosensitive body is employed, the elasticity of the sealing member is insufficient so that the sealing member may not follow the oscillation of the cleaning blade, or an elastic force of the sealing member is lowered due to deterioration according to time, and thus the sealing member may not follow the oscillation of the cleaning blade.

SUMMARY

Exemplary embodiments address at least the above problems and/or disadvantages and other disadvantages not described above. Also, the exemplary embodiments are not required to overcome the disadvantages described above, and may not overcome any of the problems described above.

Exemplary embodiments provide cleaning devices that may more effectively prevent a developing agent from leaking from an end of a cleaning blade as cleaning devices for removing a residual developing agent on a photosensitive body, and elecrophotographic image forming apparatuses having the cleaning devices.

According to an aspect of an exemplary embodiment, there is provided a cleaning device configured to remove a developing agent from a photosensitive body, the cleaning device including a cleaning blade assembly including a cleaning blade configured to remove the developing agent, and a support plate configured to support the cleaning blade. The cleaning device further includes a housing portion configured to support the cleaning blade assembly, and a scattering prevention portion configured to prevent the developing agent from leaking through a gap between an end of the cleaning blade and the housing portion in a lengthwise direction, extend in the lengthwise direction over the end of the cleaning blade, and connect the cleaning blade assembly to the housing portion.

The scattering prevention portion may include a first scattering prevention portion disposed in the cleaning blade assembly, and a second scattering prevention portion disposed in the housing portion. One of the first scattering prevention portion and the second scattering prevention portion may include an extension portion configured to extend in the lengthwise direction over the end of the cleaning blade, and another one of the first scattering prevention portion and the second scattering prevention portion may include an accommodation portion configure to accommodate the extension portion.

The other one of the first scattering prevention portion and the second scattering prevention portion may include an elastic member.

The first scattering prevention portion may include a film member, the film member including the extension portion configured to extend toward the housing portion over the end of the cleaning blade. The second scattering prevention portion may include a first sealing member and a second sealing member configured to overlap each other, and the accommodation portion disposed between the first sealing member and the second sealing member.

The extension portion may be disposed between the first sealing member and the second sealing member.

The second scattering prevention portion may include a frictional contact member configured to overlap the second sealing member, and frictionally contact the photosensitive body.

The cleaning blade may be disposed on a first surface of the support plate, and the film member may be disposed on a second surface of the support plate that is opposite to the first surface.

The first scattering prevention portion may include an elastic absorption member disposed between the cleaning blade and the film member, the elastic absorption member configured to absorb elasticity of the film member that affects a contact force of the cleaning blade with respect to the photosensitive body.

The elastic absorption member may be attached to the film member.

The second scattering prevention portion may include a film member, the film member including the extension portion configured to extend toward the cleaning blade assembly over the end of the cleaning blade. The first scattering prevention portion may include an elastic member attached to the cleaning blade assembly, and the accommodation portion disposed between the cleaning blade assembly and the elastic member.

The elastic member may be attached to the support plate, and the accommodation portion may be disposed between the elastic member and the support plate.

The first scattering prevention portion may be disposed at a position lower than a contact point between the photosensitive body and the cleaning blade.

The scattering prevention portion may include a film member attached to the cleaning blade assembly, the film member including an extension portion configured to extend toward the housing portion over the end of the cleaning blade. The extension portion may be connected to the housing portion.

The scattering prevention portion may include a sealing member attached to the housing portion and the extension portion.

The cleaning blade may be configured to oscillate in either one or both of a diameter direction of the photosensitive body and an axial direction parallel to a rotation axis of the photosensitive body.

According to an aspect of an exemplary embodiment, there is provided an electrophotographic image forming apparatus including a photosensitive body on which an electrostatic latent image is formed, a developing portion configured to attach a developing agent onto the electrostatic latent image to develop a toner image, a transferring portion configured to transfer the toner image onto a recording medium, and a cleaning device configured to remove a developing agent that remains on the photosensitive body after the transferring. The cleaning device includes a cleaning blade assembly including a cleaning blade configured to remove the developing agent, and a support plate configured to support the cleaning blade. The cleaning device further includes a housing portion configured to support the cleaning blade assembly, and a scattering prevention portion configured to prevent the developing agent from leaking through a gap between an end of the cleaning blade and the housing portion in a lengthwise direction, extend in the lengthwise direction over the end of the cleaning blade, and connect the cleaning blade assembly to the housing portion.

According to an aspect of an exemplary embodiment, there is provided a cleaning device configured to remove a developing agent from a photosensitive body, the cleaning device including a blade configured to trace a contour of the photosensitive body to remove the developing agent from the photosensitive body, a plate disposed on the blade, a housing, and a film member configured to connect the plate to the housing as the blade traces the contour of the photosensitive body.

The cleaning device may further include a first elastic member disposed on the housing, and a second elastic member disposed on the first elastic member. The film member may be disposed on the plate and between the first elastic member and the second elastic member.

The cleaning device may further include a contact member disposed on the second elastic member, the contact member including a first portion configured to contact the blade, and a second portion configured to contact the photosensitive body.

The cleaning device may further include an elastic member disposed on the plate. The film member may be disposed on the housing and between the plate and the elastic member.

The cleaning device may further include a contact member disposed on the housing, the contact member configured to contact the photosensitive body.

The cleaning device may further include an elastic member disposed on the housing. The film member may be disposed between the plate and the elastic member.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and/or other aspects will be more apparent by describing certain exemplary embodiments with reference to the accompanying drawings in which:

FIG. **1**A is a cross-sectional view of a drum portion including a cleaning device according to a first exemplary embodiment;

FIG. **1**B is a another cross-sectional view of the drum portion including the cleaning device according to the first exemplary embodiment;

FIG. **2** is a front view illustrating a state in which a cleaning blade assembly is installed at a housing portion of the drum portion according to the first exemplary embodiment;

FIG. **3**A is a front view of the cleaning blade assembly of the cleaning device according to the first exemplary embodiment;

FIG. **3**B is a side view of the cleaning blade assembly of the cleaning device according to the first exemplary embodiment;

FIG. **4**A is a front view of a first developing agent scattering prevention portion of the cleaning device according to the first exemplary embodiment;

FIG. **4**B is a perspective view of the first developing agent scattering prevention portion of the cleaning device according to the first exemplary embodiment;

FIG. **5**A is a front view illustrating a state in which the first developing agent scattering prevention portion is attached to the cleaning blade assembly of the cleaning device according to the first exemplary embodiment;

FIG. **5**B is a side view illustrating the state in which the first developing agent scattering prevention portion is attached to the cleaning blade assembly of the cleaning device according to the first exemplary embodiment;

FIG. **6** is a side view of a mutual position relationship between the first developing agent scattering prevention portion and a second developing agent scattering prevention portion of the cleaning device according to the first exemplary embodiment;

FIG. **7**A is a view illustrating a process of manufacturing elements of the cleaning device according to the first exemplary embodiment;

FIG. 7B is a view illustrating the process of manufacturing the elements of the cleaning device according to the first exemplary embodiment;

FIG. 7C is a view illustrating the process of manufacturing the elements of the cleaning device according to the first exemplary embodiment;

FIG. 7D is a view illustrating the process of manufacturing the elements of the cleaning device according to the first exemplary embodiment;

FIG. 7E is a view illustrating the process of manufacturing the elements of the cleaning device according to the first exemplary embodiment;

FIG. 7F is a view illustrating the process of manufacturing the elements of the cleaning device according to the first exemplary embodiment;

FIG. 7G is a view of a mutual position relationship between the first developing agent scattering prevention portion and a back film member of the cleaning device according to the first exemplary embodiment;

FIG. 8A is a view illustrating an effect of the elements of the cleaning device according to the first exemplary embodiment;

FIG. 8B is a view illustrating the effect of the elements of the cleaning device according to the first exemplary embodiment;

FIG. 8C is a view illustrating the effect of the elements of the cleaning device according to the first exemplary embodiment;

FIG. 8D is a view illustrating the effect of the elements of the cleaning device according to the first exemplary embodiment;

FIG. 9 is a view of a cleaning device according to a second exemplary embodiment;

FIG. 10 is a side view of elements of a cleaning device according to a third exemplary embodiment;

FIG. 11A is a view illustrating an effect of the elements of the cleaning device according to the third exemplary embodiment;

FIG. 11B is a view illustrating the effect of the elements of the cleaning device according to the third exemplary embodiment;

FIG. 11C is a view illustrating the effect of the elements of the cleaning device according to the third exemplary embodiment;

FIG. 12A is a view illustrating a cleaning device according to related art;

FIG. 12B is a view illustrating the cleaning device according to the related art;

FIG. 12C is a view illustrating the cleaning device according to the related art; and

FIG. 13 is a view of a configuration of an image forming apparatus according to an exemplary embodiment.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

Exemplary embodiments are described in greater detail herein with reference to the accompanying drawings.

In the following description, like drawing reference numerals are used for like elements, even in different drawings. The matters defined in the description, such as detailed construction and elements, are provided to assist in a comprehensive understanding of the exemplary embodiments. However, it is apparent that the exemplary embodiments can be practiced without those specifically defined matters. Also, well-known functions or constructions are not described in detail because they would obscure the description with unnecessary detail.

It will be understood that the terms "comprises" and/or "comprising" used herein specify the presence of stated features or components, but do not preclude the presence or addition of one or more other features or components. In addition, the terms such as "unit", "-er (-or)", and "module" described in the specification refer to an element for performing at least one function or operation, and may be implemented in hardware, software, or the combination of hardware and software.

FIGS. 1A and 1B are cross-sectional views of a drum portion 1 including a cleaning device according to a first exemplary embodiment, and FIG. 2 is a front view illustrating a state in which a cleaning blade assembly 11 is installed at a housing portion 12 of the drum portion 1 according to the first exemplary embodiment. In detail, FIG. 1A is a cross-sectional view taken along line B-B of FIG. 2, and FIG. 1B is another cross-sectional view taken along line A-A of FIG. 2.

As illustrated in FIGS. 1A and 1B, the drum portion 1 includes a photosensitive body 13, a charging roller 18, a cleaning roller 19 that cleans the charging roller 18, the cleaning blade assembly 11, the housing portion 12, a back film member including a lower back film member 17*a* and an upper back film member 17*b*, and an auger screw 14 that is a residual developing agent recovering mechanism.

As illustrated in FIG. 1A, the cleaning blade assembly 11 contacts the photosensitive body 13, and removes the residual developing agent on the photosensitive body 13. The removed residual developing agent is fed back to a front of the drawing due to the auger screw 14, and is recovered. A closed space 20 is formed by the housing portion 12, the photosensitive body 13, the cleaning blade assembly 11, the upper back film member 17*b*, and the lower back film member 17*a*. While the developing agent is removed and then recovered, the residual developing agent is accommodated in the closed space 20 to prevent the residual developing agent from scattering and penetrating other portions of the cleaning device.

FIGS. 3A and 3B are views of the cleaning blade assembly 11 of the cleaning device according to the first exemplary embodiment. In detail, FIG. 3A is a front view of the cleaning blade assembly 11, and FIG. 3B is a side view of the cleaning blade assembly 11.

As illustrated in FIGS. 3A and 3B, the cleaning blade assembly 11 includes a cleaning blade 111 that contacts the photosensitive body 13 and removes the residual developing agent, a support plate 112 that supports the cleaning blade 111, and a support member 113 that supports the support plate 112. The cleaning device is a counter-type cleaning device in which the cleaning blade 111 is disposed to face a rotation direction C of the photosensitive body 13, as illustrated in FIG. 1A. That is, a front end 111*a* of the cleaning blade 111 is directed in an opposite direction to the rotation direction C of the photosensitive body 13.

The support member 113 is mounted in the cleaning blade assembly 11 to oscillate with respect to the housing portion 12. Thus, the cleaning blade 111 is supported at the housing portion 12 to oscillate with respect to the photosensitive body 13. At least a part of the cleaning blade assembly 11, for example, the cleaning blade 111, is formed of an elastic member, thereby effectively removing the residual developing agent while following a surface of the photosensitive body 13.

For example, the cleaning blade **111** may oscillate in a direction of a diameter of the photosensitive body **13**. For example, an axial portion **113***a* disposed on an end of the support member **113** is supported to be pivotable around the housing portion **12** so the cleaning blade **111** may oscillate in the direction of the diameter of the photosensitive body **13** when the axial portion **113***a* is used as a central axis. A hole **113***b* into which an axial portion disposed in the housing portion **12** is inserted, is disposed in another end of the support member **113**. Thus, the cleaning blade **111** may oscillate in the diameter direction of the photosensitive body **13** when the axial portion **113***a* disposed in the support member **113** and the axial portion disposed in the housing portion **12** are used as central axes.

The cleaning device includes a developing agent scattering prevention portion that prevents the developing agent from leaking through a gap between an end of the cleaning blade **111** and the housing portion **12** in a lengthwise direction. The developing agent scattering prevention portion extends in the lengthwise direction of the cleaning blade **111** over an end of the cleaning blade **111**, and connects the cleaning blade assembly **11** and the housing portion **12** together. The developing agent scattering prevention portion includes a first developing agent scattering prevention portion **15** and a second developing agent scattering prevention portion **16**, as will be shown in and described with respect to FIGS. **4**A, **4**B, **5**A, **5**B, and **6**.

FIGS. **4**A and **4**B are views of the first developing agent scattering prevention portion **15** of the cleaning device according to the first exemplary embodiment. In detail, FIG. **4**A is a front view of the first developing agent scattering prevention portion **15**, and FIG. **4**B is a perspective view of the first developing agent scattering prevention portion **15**.

The first developing agent scattering prevention portion **15** includes a film member **153** including an attaching portion **151** attached to the support plate **112** of the cleaning blade assembly **11**, and an extension portion **154**, as will be described below.

FIGS. **5**A and **5**B are views illustrating a state in which the first developing agent scattering prevention portion **15** is attached to the cleaning blade assembly **11** of the cleaning device according to the first exemplary embodiment. In detail, FIG. **5**A is a front view of the state, and FIG. **5**B is a side view of the state. Also, FIG. **5**A illustrates a right end of the cleaning blade assembly **11**, and a left end of the cleaning blade assembly **11** may have the same shape as that of the right end of the cleaning blade assembly **11**.

As illustrated in FIGS. **5**A and **5**B, the attaching portion **151** of the first developing agent scattering prevention portion **15** is attached to the support plate **112**. The cleaning blade **111** is attached to contact a surface of the support plate **112**, for example, a surface **112***a*, and the attaching portion **151** of the first developing agent scattering prevention portion **15** is attached to a rear surface **112***b* that is opposite to the surface **112***a* of the support plate **112**. The surface **112***a* is directed toward the photosensitive body **13**. The extension portion **154** of the film member **153** protrudes from a right end **111***b* of the cleaning blade **111** outward. That is, the extension portion **154** extends toward the housing portion **12** over the right end **111***b* of the cleaning blade **111**.

Because the film member **153** having the attaching portion **151** is employed, the attaching portion **151** of the film member **153** is attached to the support plate **112** so that the film member **153** may be coupled to the cleaning blade assembly **11**. That is, the film member **153** is not directly attached to the cleaning blade **111**. Thus, an effect of the film member **153** on a contact force of the cleaning blade **111** with respect to the photosensitive body **13** may be suppressed.

Referring back to FIGS. **4**A and **4**B, the first developing agent scattering prevention portion **15** further includes a third sealing member (elastic absorption member) **152** attached to the film member **153**. The third sealing member **152** may have an approximately rectangular parallelepiped shape. The third sealing member **152** is formed of an elastic member, such as a sponge. For example, the third sealing member **152** may be formed of a closed-cell foam sponge.

Referring again to FIGS. **5**A and **5**B, a space between the film member **153** of the first developing agent scattering prevention portion **15** and the cleaning blade **111**, i.e., a space formed between the cleaning blade **111** and the film member **153** according to a thickness of the support plate **112**, is filled with the third sealing member **152**. Because the third sealing member **152** is interposed between the film member **153** and the cleaning blade **111**, and the third sealing member **152** is formed of an elastic member, an effect of elasticity of the film member **153** with respect to the cleaning blade **111** may be absorbed by the third sealing member **152**.

FIG. **6** is a side view illustrating a mutual position relationship between the first developing agent scattering prevention portion **15** and the second developing agent scattering prevention portion **16** of the cleaning device according to the first exemplary embodiment.

The second developing agent scattering prevention portion **16** includes a first sealing member **161** attached to the housing portion **12**, a second sealing member **162**, and a frictional contact member **163** that frictionally contacts the photosensitive body **13**.

For example, each of the first sealing member **161** and the second sealing member **162** may be formed of a closed-cell foam sponge that is an elastic member, and the frictional contact member **163** may be formed of a felt material that is non-woven fabric. As illustrated in FIG. **6**, the cleaning device has a structure in which at least a part of the first developing agent scattering prevention portion **15** is inserted into the second developing agent scattering prevention portion **16**, i.e., a structure in which the first developing agent scattering prevention portion **15** is inserted between the first sealing member **161** and the frictional contact member **163** with the second sealing member **162**. That is, the second developing agent scattering prevention portion **16** includes an accommodation portion **164** formed between the first sealing member **161** and the second sealing member **162**, and that accommodates at least a part of the first developing agent scattering prevention portion **15**. In the first exemplary embodiment, the extension portion **154** that extends over the end **111***b* of the cleaning blade **111** is inserted into the accommodation portion **164**.

Subsequently, an example of a process of forming a structure in which at least a part of the first developing agent scattering prevention portion **15** illustrated in FIG. **6** is inserted into the second developing agent scattering prevention portion **16** will be described with reference to FIGS. **7**A through **7**F.

FIGS. **7**A through **7**F are views illustrating a process of manufacturing elements of the cleaning device according to the first exemplary embodiment. In FIGS. **7**A through **7**F, a right end of the housing portion **12** is enlarged, and a shape of a left end of the housing portion **12** is the same as that of the right end of the housing portion **12**.

First, as illustrated in FIG. **7**A, the first sealing member **161** is attached to a position in which the right end of the

cleaning blade assembly **11** of the housing portion **12** is disposed. Thus, a state of FIG. **7**B is established. The first sealing member **161** may be formed of a closed-cell foam sponge that is an elastic member, and has an approximately rectangular parallelepiped shape.

Subsequently, as illustrated in FIG. **7**C, the cleaning blade assembly **11** is mounted on the housing portion **12**. Thus, a portion of the first developing agent scattering prevention portion **15** attached to the cleaning blade assembly **11** protrudes from the cleaning blade **111**, and overlaps the first sealing member **161**. That is, the extension portion **154** of the film member **153** protrudes from the right end **111***b* of the cleaning blade **111**, and overlaps the first sealing member **161**. The extension portion **154** may be attached to the first sealing member **161**.

Subsequently, as illustrated in FIG. **7**D, the second sealing member **162** overlaps the extension portion **154** of the first developing agent scattering prevention portion **15** that protrudes from the cleaning blade **111**, and the first developing agent scattering prevention portion **15** and the second sealing member **162** are attached to each other at the overlapping portion. The second sealing member **162** may be formed of a closed-cell foam sponge that is an elastic member, and has of an approximately rectangular parallelepiped shape.

As illustrated in FIG. **7**E, the frictional contact member **163** is disposed on and overlaps the second sealing member **162**. Thus, a state of FIG. **7**F is established, and a schematic side view thereof is FIG. **6**.

A contact portion **163***a* of the frictional contact member **163** contacts an outer circumference of the cleaning blade **111**, as illustrated in FIG. **7**F. Thus, no gap is formed between the frictional contact member **163** and the cleaning blade **111**. That is, the cleaning blade **111** and the frictional contact member **163** form "one surface". A portion **163***b* of a top end of the frictional contact member **163** overlaps the upper back film member **17***b*. The photosensitive body **13**, the upper back film member **17***b*, and the frictional contact member **163** are disposed from a left side of FIG. **1**B, and thereby, the upper back film member **17***b* may be disposed between the photosensitive body **13** and the frictional contact member **163**. A portion **163***c* of the frictional contact member **163** that frictionally contacts the photosensitive body **13** is disposed under the overlapping portion **163***b*. Also, the contact portion **163***a* disposed under the portion **163***c* forms "one surface" with the cleaning blade **111**, as described above. Thus, sealing characteristics of the closed space **20** formed by the housing portion **12**, the photosensitive body **13**, the cleaning blade assembly **11**, and the back film member **17** may be enhanced.

FIG. **7**G is a view of a mutual position relationship between the first developing agent scattering prevention portion **15** and the lower back film member **17***a* of the cleaning device according to the first exemplary embodiment.

As illustrated in FIG. **7**G, a part of the first developing agent scattering prevention portion **15**, for example, a part of the extension portion **154**, and a part of the lower back film member **17***a* overlap each other so that sealing characteristics of the closed space **20** may be enhanced.

Subsequently, an effect of preventing the developing agent from leaking from the end of the cleaning blade **111** using the cleaning device according to the first exemplary embodiment will be described with reference to FIGS. **8**A through **8**D by comparing with examples of related art illustrated in FIGS. **12**A through **12**C.

FIGS. **12**A through **12**C are views illustrating a cleaning device according to the related art. In detail, FIGS. **12**A through **12**C are cross-sectional views corresponding cross-sectional views taken along line E-E of FIG. **6**, of the cleaning device according to the related art.

As illustrated in FIGS. **12**A through **12**C, the cleaning device according to the related art has a structure in which a developing agent is prevented from leaking from a space between both ends of a cleaning blade **211** and a housing portion **212**. A sealing member **200** having elasticity is installed between ends of a cleaning blade assembly **210** and the housing portion **212** so that a gap between both ends of the cleaning blade **211** and the housing portion **212** may be clogged.

However, the cleaning device according to the related art has a structure in which a lateral end of the sealing member **200** and a lateral end of the cleaning blade assembly **210** contact each other, as illustrated in FIG. **12**A. Thus, adhesion performance between the sealing member **200** and the cleaning blade assembly **210** is not so high. Thus, when, in particular, an oscillating-type cleaning blade is employed, the cleaning device according to the related art does not properly respond to oscillation of the cleaning blade **211** and a change of elapsed time so that an effect of preventing leakage of the developing agent may not sufficiently be obtained.

That is, for example, in the cleaning device according to the related art that oscillates in a direction of a diameter of a photosensitive body, as illustrated in FIG. **12**B, due to a lowered elastic force caused by deterioration over time of the sealing member **200**, a gap G is formed in a contact portion between the lateral end of the sealing member **200** and the lateral end of the cleaning blade assembly **210**, and the developing agent may leak through the gap G. Because the sealing member **200** is formed of an elastic member, the sealing member **200** has a pressing force on the elastic cleaning blade assembly **210**. However, deformation occurs due to a lowered elastic force caused by repeated usage, i.e., repeated oscillation of the blade **211**, so that the gap G illustrated in FIG. **12**B is formed.

Also, in the cleaning device according to the related art that oscillates in a direction parallel to an axis of the photosensitive body, as illustrated in FIG. **12**C, the gap G is more easily formed. That is, when an elastic force cannot follow the oscillation of the blade **211** or is lowered by deterioration over time of the sealing member **200**, the gap G is easily formed, and the developing agent may leak through the gap G.

FIGS. **8**A through **8**D are views illustrating an effect of the elements of the cleaning device according to the first exemplary embodiment. In detail, FIGS. **8**A through **8**D are the cross-sectional views taken along the line E-E of FIG. **6**.

As illustrated in FIG. **8**A, the cleaning device according to the first exemplary embodiment has a portion in which the first developing agent scattering prevention portion **15** installed in the cleaning blade assembly **11** and the second developing agent scattering prevention portion **16** installed in the housing portion **12** overlap each other. That is, the cleaning device has a structure in which a part (the extension portion **154**) of the first developing agent scattering prevention portion **15** is inserted into a part (the accommodation portion **164**) of the second developing agent scattering prevention portion **16**. Thus, the developing agent may be effectively prevented from leaking from the end **111***b* of the cleaning blade **111**.

That is, as illustrated in FIGS. **8**B and **8**C, even when the cleaning blade assembly **11** oscillates in the direction of the diameter of the photosensitive body **13**, an occurrence of a gap between the housing portion **12** and the cleaning blade

assembly **11** is securely prevented. Thus, even when an elastic force of the first sealing member **161** or the second sealing member **162** is lowered by deterioration over time, an occurrence of a leakage route of the residual developing agent is effectively prevented.

The cleaning device according to the first exemplary embodiment that oscillates in the direction of the diameter of the photosensitive body **13** has been described. However, as illustrated in FIG. **8**D, even when the cleaning device oscillates in an axial direction parallel to a rotation axis of the photosensitive body **13**, and even when the elastic force of the first sealing member **161** or the second sealing member **162** is lowered by deterioration over time, the occurrence of the leakage route of the residual developing agent is effectively prevented by the first developing agent scattering prevention portion **15**. That is, even when a gap is formed between the end **111***b* of the cleaning blade **111** and the second developing agent scattering prevention portion **16**, the extension portion **154** clogs the gap so that the occurrence of the leakage route of the residual developing agent is effectively prevented.

As described above, the cleaning device according to the first exemplary embodiment has the portion in which the first developing agent scattering prevention portion **15** installed in the cleaning blade assembly **11** and the second developing agent scattering prevention portion **16** installed in the housing portion **12** overlap each other, and has a structure in which the first developing agent scattering prevention portion **15** is inserted into the second developing agent scattering prevention portion **16**. Thus, the cleaning device effectively prevents the developing agent from leaking from the end of the cleaning blade **111**.

Referring again to FIG. **1**A, the cleaning blade assembly **11** contacts the surface of the photosensitive body **13** using a counter method. The residual developing agent removed by the cleaning blade assembly **11** drops toward a lower side of the drawing.

That is, a large amount of the residual developing agent removed from the photosensitive body **13** remains at a lower position than a contact point F between the photosensitive body **13** and the cleaning blade assembly **11**. Thus, measures for preventing leakage of the developing agent need to be further performed. According to the first exemplary embodiment, the first developing agent scattering prevention portion **15** is disposed at a lower position than the contact point F between the photosensitive body **13** and the cleaning blade assembly **11** (in an opposite position to the photosensitive body **13** based on the contact point F).

In the first exemplary embodiment, a structure in which a part of the first developing agent scattering prevention portion **15** is inserted into the accommodation portion **164** of the second developing agent scattering prevention portion **16** has been described. However, exemplary embodiments are not limited thereto.

FIG. **9** is a view of a cleaning device according to a second exemplary embodiment As illustrated in FIG. **9**, a structure in which a second developing agent scattering prevention portion **16'** installed in the housing portion **12** is inserted into a first developing agent scattering prevention portion **15'** installed in the cleaning blade assembly **11**, is shown.

In detail, the second developing agent scattering prevention portion **16'** is disposed in the housing portion **12**. The second developing agent scattering prevention portion **16'** includes a film member including an extension portion **165** that extends over the end **111***b* of the cleaning blade **111**. Hereinafter, the second developing agent scattering prevention portion **16'** is referred to as a film member **16'**. The first developing agent scattering prevention portion **15'** is attached to the cleaning blade assembly **11**. The first developing agent scattering prevention portion **15'** includes an elastic member, and an accommodation portion **155** between the elastic member and the support plate **112** and that accommodates the extension portion **165**. Hereinafter, the first developing agent scattering prevention portion **15'** is referred to as an elastic member **15'**.

When the elastic member **15'** is attached to the cleaning blade assembly **11**, for example, a rear surface **112***b* of the support plate **112**, the accommodation portion **155** in which the extension portion **165** of the film member **16'** is disposed between the elastic member **15'** and the rear surface **112***b*, is formed so that a structure in which a part of the film member **16'** is inserted into the elastic member **15'** is established. Through this structure, the above-described effects may be achieved.

Also, as illustrated in FIG. **9**, a frictional contact member **163'** that frictionally contacts the photosensitive body **13** is attached to the housing portion **12**.

In the first exemplary embodiment, the film member **153** is attached to the cleaning blade assembly **11** so that the first developing agent scattering prevention portion **15** is formed. However, exemplary embodiments are not limited thereto. For example, the first developing agent scattering prevention portion **15** may also include the extension portion **154** formed by extending a part of an end of the cleaning blade assembly **11**, for example, a part of an end of the support plate **112** over the end **111***b* of the cleaning blade **111**. That is, the first developing agent scattering prevention portion **15** may also be a part of the cleaning blade assembly **11**.

Similarly, for example, in the second exemplary embodiment of FIG. **9**, the second developing agent scattering prevention portion **16'** may also include the extension portion **165** formed by extending a part of the housing portion **12** over the end **111***b* of the cleaning blade **111**. That is, the second developing agent scattering prevention portion **16'** may also be a part of the housing portion **12**.

Also, in the first exemplary embodiment, the overlapping portion of the first developing agent scattering prevention portion **15** and the first sealing member **161** and the overlapping portion of the first developing agent scattering prevention portion **15** and the second sealing member **162** are attached to each other. However, they may not be attached to each other.

That is, as illustrated in FIGS. **8**B through **8**D, even when some or all of the overlapping portions are not attached to each other, the cleaning device includes a portion in which the first developing agent scattering prevention portion **15** and the second developing agent scattering prevention portion **16** overlap each other, and has a structure in which the first developing agent scattering prevention portion **15** is inserted into the second developing agent scattering prevention portion **16**, so that the occurrence of the leakage route of the residual developing agent may be prevented.

Also, when the overlapping portion of the first developing agent scattering prevention portion **15** and the first sealing member **161** and the overlapping portion of the first developing agent scattering prevention portion **15** and the second sealing member **162** are attached to each other, oscillation of the cleaning blade assembly **11** may be disturbed. However, because each of the first sealing member **161** and the second sealing member **162** is formed of an elastic member, oscillation of the cleaning blade assembly **11** is not disturbed. As illustrated in FIG. **11**C according the third exemplary embodiment that will be described later, due to elastic

deformation of a sealing member that is an elastic member, the cleaning device may follow an oscillating operation of the cleaning blade assembly **11** without a problem.

In the first exemplary embodiment, the first developing agent scattering prevention portion **15** and the lower back film member **17***a* overlap each other. However, the first developing agent scattering prevention portion **15** or the second developing agent scattering prevention portion **16** and the upper back film member **17***b* may overlap each other.

In the first exemplary embodiment, a sponge has been described as an example of an elastic member that forms the first sealing member **161**, the second sealing member **162**, and the second sealing member **162**. However, exemplary embodiments are not limited thereto, and various materials that may have a predetermined elastic force and may prevent leakage of the developing agent may be used to form the elastic member. Also, in the first exemplary embodiment, a closed-cell foam sponge has been described. Thus, leakage of the developing agent may be effectively prevented. Even when an open-cell foam sponge is used to form the elastic member, the open-cell foam sponge having small bubbles with respect to a diameter of particles of the developing agent to prevent leakage of the developing agent may be used. Exemplary embodiments are not limited to forming small bubbles of the sponge, and after the bubbles are formed, the sponge may be compressed so that the bubbles may be broken.

Also, in the first exemplary embodiment, the cleaning blade **111** contacts the surface of the photosensitive body **13** using the counter method. However, exemplary embodiments are not limited thereto, and other methods may be used.

In a third exemplary embodiment, a developing agent scattering prevention portion that connects the cleaning blade assembly **11** and the housing portion **12** together is installed.

FIG. **10** is a side view of elements of a cleaning device according to a third exemplary embodiment. FIG. **10** corresponds to FIG. **6** according to the first exemplary embodiment. As illustrated in FIG. **10**, the cleaning device according to the third exemplary embodiment includes the cleaning blade assembly **11** having the first developing agent scattering prevention portion **15** attached to the cleaning blade assembly **11**, and the sealing member **161** attached to the housing portion **12**, which have the same configuration as the first exemplary embodiment.

The film member **153** of the first developing agent scattering prevention portion **15** includes a portion that overlaps the cleaning blade assembly **11**, and simultaneously, includes a portion (the extension portion **154**) that overlaps the sealing member **161** attached to the housing portion **12**, like in the first exemplary embodiment. Thus, the film member **153** of the first developing agent scattering prevention portion **15** is attached to the cleaning blade assembly **11** and the housing portion **12** by connecting them together. In detail, the attaching portion **151** of the film member **153** is attached to the support plate **112**, and the extension portion **154** of the film member **153** is attached to the housing portion **12** or the sealing member **161**. In the third exemplary embodiment, the third sealing member **162** and the frictional contact member **163** of the first exemplary embodiment are not disposed.

FIGS. **11**A through **11**C are views illustrating an effect of the elements of the cleaning device according to the third exemplary embodiment. In detail, FIGS. **11**A through **11**C are cross-sectional views taken along line H-H of FIG. **10**, that is, views in which an end of the cleaning blade **111** is viewed from below, illustrating preventing of a developing agent from leaking from the end **111***b* of the cleaning blade **111**.

As illustrated in FIG. **11**A, the first developing agent scattering prevention portion **15** includes a portion in which the first developing agent scattering prevention portion **15** and the cleaning blade assembly **11** overlap each other and a portion in which the first developing agent scattering prevention portion **15** and the housing portion **12** having the sealing member **161** overlap each other, so that the developing agent is effectively prevented from leaking from the end **111***b* of the cleaning blade **111**.

That is, as illustrated in FIG. **11**B, even when the cleaning blade assembly **11** oscillates in the direction of the diameter of the photosensitive body **13**, an occurrence of a gap between the housing portion **12** and the cleaning blade assembly **11** may be securely prevented. Even when an elastic force of the sealing member **161** is lowered by deterioration over time, an occurrence of a leakage route of the residual developing agent is effectively prevented.

Also, as illustrated in FIG. **11**C, even when the cleaning blade assembly **11** oscillates in the axial direction parallel to the rotation axis of the photosensitive body **13**, the cleaning device has a structure in which the first developing agent scattering prevention portion **15** overlaps the cleaning blade assembly **11** and the sealing member **161** attached to the housing portion **12**. Thus, even when the elastic force of the sealing member **161** is lowered by deterioration over time while responding to the oscillation of the blade **111**, the occurrence of the leakage route of the residual developing agent is effectively prevented.

As described above, the cleaning device according to the third exemplary embodiment effectively prevents the developing agent from leaking from the end of the cleaning blade **111**.

FIG. **13** is a view of a configuration of an image forming apparatus according to an exemplary embodiment. The image forming apparatus is an electrophotographic color image forming apparatus that forms color images by employing four developing portions **1100** in which toners (developing agents) of cyan (C), magenta (M), yellow (Y) and black (K) colors are respectively accommodated. Hereinafter, C, M, Y, and K are added after reference numerals of members used to form images of C, M, Y, and K colors.

Referring to FIG. **13**, the image forming apparatus includes an exposer **1200**, the four developing portions **1100**, a transferring portion, and a fuser **1500**.

Each of the four developing portions **1100** includes the drum portion **1**, a developing roller portion **2**, a photosensitive drum **21**, a charging roller **18**, and a developing roller **23**. The structure of the drum portion **1** is as described with reference to FIG. **1**A, and the drum portion **1** includes the above-described cleaning device. The photosensitive drum **21** is an example of a photosensitive body (e.g., the photosensitive body **13** of FIG. **1**B) in which an electrostatic latent image is formed. The photosensitive drum **21** may be a photosensitive drum in which a photosensitive layer having optical conductivity is formed on an outer circumference of a cylindrical metal pipe. The charging roller **18** is a charging device for charging a surface of the photosensitive drum **21** to a uniform electric potential. A corona charging device may also be employed, instead of the charging roller **18**.

The exposer **1200** forms an electrostatic latent image by radiating light modulated to correspond to image information onto the photosensitive drum **21**. A light-emitting diode (LED) exposer that causes a plurality of LEDs arranged in

a main scanning direction to optionally emit light according to the image information may be employed as the exposer **1200**. Also, a laser scanning unit (LSU) that deflects light emitted from a laser diode in the main scanning direction using a deflector and scans the light onto the photosensitive drum **1** may be employed as the exposer **1200**. The developing roller **23** attaches the toner accommodated in the developing roller portion **2** onto the electrostatic latent image formed on the photosensitive drum **21**, thereby developing a toner image. The toner may be accommodated in the developing roller portion **2** and may be supplied to the developing roller portion **2** from a toner container (not shown). The toner container (not shown) may be replaced separately from the developing portions **1100** when all of the toner accommodated in the toner container (not shown) is used up.

The transferring unit transfers the developed toner image on the photosensitive drum **21** onto a recording medium P. The transferring unit transfers the toner image onto the recording medium P via an intermediate transfer belt **1300**.

The intermediate transfer belt **1300** that is an intermediate transfer medium onto which the toner image is temporarily transferred before the toner image is finally transferred onto the recording medium P is supported by supporting rollers **1301** and **1302** and circulates thereon. The four developing portions **1100** are disposed in such a way that the photosensitive drum **21** faces a bottom surface **1303** of the intermediate transfer belt **1300**. The photosensitive drum **21** contacts the bottom surface **1303** of the intermediate transfer belt **1300**. Each of four intermediate transfer rollers **1310** is an example of an intermediate transferring unit for transferring the toner image formed on the photosensitive drum **21** onto the intermediate transfer belt **1300**. The four intermediate transfer rollers **1310** are placed to respectively face four photosensitive drums in a state in which the bottom surface **1303** of the intermediate transfer belt **1300** is placed between the four photosensitive drums and the four intermediate transfer rollers **1310**. Intermediate transfer bias voltages may be applied to the four intermediate transfer rollers **1310** so that the toner image formed on the photosensitive drum **21** may be transferred onto the intermediate transfer belt **1300**. A corona transferring unit may also be employed, instead of the intermediate transfer roller **1310**.

A final transfer roller **1320** transfers the toner image on the intermediate transfer belt **1300** onto the recording medium P. A final transfer bias voltage may be applied to the final transfer roller **1320** so that the toner image on the intermediate transfer belt **1300** may be transferred onto the recording medium P. A corona transferring unit may also be employed, instead of the final transfer roller **1320**. The fuser **1500** fuses the toner image transferred onto the recording medium P by heating and pressing the toner image.

An operation of forming color images having the above-described configuration will be briefly described.

First, the exposer **1200** forms an electrostatic latent image by radiating light onto a photosensitive drum **21**K charged to a uniform electric potential using a charging roller **18**K according to image information **1400** of the K color. If a developing bias voltage is applied to a developing roller **23**K of a developing portion **1100**K, black toner accommodated in the developing portion **1100**K is attached as an electrostatic latent image. The black toner image developed on the photosensitive drum **21**K due to an intermediate transfer bias voltage applied to an intermediate transfer roller **1310**K is transferred onto the intermediate transfer belt **1300**. Through the same process, toner images of the C color, the M color, and the Y color are transferred onto the intermediate transfer belt **1300** so that color toner images may be formed on the intermediate transfer belt **1300**. The color toner images are transferred onto the recording medium P due to a final transfer bias voltage applied to the final transfer roller **1320**, and is fused on the recording medium P using the fuser **1500**.

Residual toner that remains on the surface of the photosensitive drum **21** is removed by the above-described cleaning device after the transferring of the developed toner image onto the recording medium P, and is accommodated in the closed space **20**.

The foregoing exemplary embodiments and advantages are merely exemplary and are not to be construed as limiting. The present teaching can be readily applied to other types of apparatuses. Also, the description of the exemplary embodiments is intended to be illustrative, and not to limit the scope of the claims, and many alternatives, modifications, and variations will be apparent to those skilled in the art.

What is claimed is:

1. A cleaning device configured to remove a developing agent from a photosensitive body, the cleaning device comprising:

a cleaning blade assembly comprising a cleaning blade configured to remove the developing agent, and a support plate configured to support the cleaning blade;

a housing portion configured to support the cleaning blade assembly; and

a scattering prevention portion configured to prevent the developing agent from leaking through a gap between an end of the cleaning blade and the housing portion in a lengthwise direction, extend in the lengthwise direction over the end of the cleaning blade, and be attached to the cleaning blade assembly and the housing portion to connect the cleaning blade assembly to the housing portion.

2. The cleaning device of claim **1**, wherein the scattering prevention portion comprises a first scattering prevention portion disposed in the cleaning blade assembly, and a second scattering prevention portion disposed in the housing portion,

one of the first scattering prevention portion and the second scattering prevention portion comprises an extension portion configured to extend in the lengthwise direction over the end of the cleaning blade, and

another one of the first scattering prevention portion and the second scattering prevention portion comprises an accommodation portion configure to accommodate the extension portion.

3. The cleaning device of claim **2**, wherein the other one of the first scattering prevention portion and the second scattering prevention portion comprises an elastic member.

4. The cleaning device of claim **2**, wherein the first scattering prevention portion comprises a film member, the film member comprising the extension portion configured to extend toward the housing portion over the end of the cleaning blade, and

the second scattering prevention portion comprises a first sealing member and a second sealing member configured to overlap each other, and the accommodation portion disposed between the first sealing member and the second sealing member.

5. The cleaning device of claim **4**, wherein the extension portion is disposed between the first sealing member and the second sealing member.

6. The cleaning device of claim **4**, wherein the second scattering prevention portion comprises a frictional contact

member configured to overlap the second sealing member, and frictionally contact the photosensitive body.

7. The cleaning device of claim **4**, wherein the cleaning blade is disposed on a first surface of the support plate, and

the film member is disposed on a second surface of the support plate that is opposite to the first surface.

8. The cleaning device of claim **7**, wherein the first scattering prevention portion comprises an elastic absorption member disposed between the cleaning blade and the film member, the elastic absorption member configured to absorb elasticity of the film member that affects a contact force of the cleaning blade with respect to the photosensitive body.

9. The cleaning device of claim **8**, wherein the elastic absorption member is attached to the film member.

10. The cleaning device of claim **2**, wherein the second scattering prevention portion comprises a film member, the film member comprising the extension portion configured to extend toward the cleaning blade assembly over the end of the cleaning blade, and

the first scattering prevention portion comprises an elastic member attached to the cleaning blade assembly, and the accommodation portion disposed between the cleaning blade assembly and the elastic member.

11. The cleaning device of claim **10**, wherein the elastic member is attached to the support plate, and

the accommodation portion is disposed between the elastic member and the support plate.

12. The cleaning device of claim **2**, wherein the first scattering prevention portion is disposed at a position lower than a contact point between the photosensitive body and the cleaning blade.

13. The cleaning device of claim **1**, wherein the scattering prevention portion comprises a film member attached to the cleaning blade assembly, the film member comprising an extension portion configured to extend toward the housing portion over the end of the cleaning blade, and

the extension portion is connected to the housing portion.

14. The cleaning device of claim **13**, wherein the scattering prevention portion comprises a sealing member attached to the housing portion and the extension portion.

15. The cleaning device of claim **1**, wherein the cleaning blade is configured to oscillate in either one or both of a diameter direction of the photosensitive body and an axial direction parallel to a rotation axis of the photosensitive body.

16. An electrophotographic image forming apparatus comprising:

a photosensitive body on which an electrostatic latent image is formed;

a developing portion configured to attach a developing agent onto the electrostatic latent image to develop a toner image;

a transferring portion configured to transfer the toner image onto a recording medium; and

a cleaning device configured to remove a developing agent that remains on the photosensitive body after the transferring,

wherein the cleaning device comprises

a cleaning blade assembly comprising a cleaning blade configured to remove the developing agent, and a support plate configured to support the cleaning blade,

a housing portion configured to support the cleaning blade assembly, and

a scattering prevention portion configured to prevent the developing agent from leaking through a gap between an end of the cleaning blade and the housing portion in a lengthwise direction, extend in the lengthwise direction over the end of the cleaning blade, and be attached to the cleaning blade assembly and the housing portion to connect the cleaning blade assembly to the housing portion.

17. The electrophotographic image forming apparatus of claim **16**, wherein the scattering prevention portion comprises a first scattering prevention portion disposed in the cleaning blade assembly, and a second scattering prevention portion disposed in the housing portion,

one of the first scattering prevention portion and the second scattering prevention portion comprises an extension portion configured to extend in the lengthwise direction over the end of the cleaning blade, and

another one of the first scattering prevention portion and the second scattering prevention portion comprises an accommodation portion configure to accommodate the extension portion.

18. The electrophotographic image forming apparatus of claim **17**, wherein the other one of the first scattering prevention portion and the second scattering prevention portion comprises an elastic member.

19. The electrophotographic image forming apparatus of claim **16**, wherein the scattering prevention portion comprises a film member attached to the cleaning blade assembly, the film member comprising an extension portion configured to extend toward the housing portion over the end of the cleaning blade, and

the scattering prevention portion comprises a sealing member attached to the housing portion and the extension portion.

20. A cleaning device configured to remove a developing agent from a photosensitive body, the cleaning device comprising:

a blade configured to trace a contour of the photosensitive body to remove the developing agent from the photosensitive body;

a plate disposed on the blade;

a housing; and

a film member configured to be attached to the plate and the housing portion to connect the plate to the housing as the blade traces the contour of the photosensitive body.

21. The cleaning device of claim **20**, further comprising:

a first elastic member disposed on the housing; and

a second elastic member disposed on the first elastic member,

wherein the film member is disposed on the plate and between the first elastic member and the second elastic member.

22. The cleaning device of claim **21**, further comprising:

a contact member disposed on the second elastic member, the contact member comprising a first portion configured to contact the blade, and a second portion configured to contact the photosensitive body.

23. The cleaning device of claim **20**, further comprising:

an elastic member disposed on the plate,

wherein the film member is disposed on the housing and between the plate and the elastic member.

24. The cleaning device of claim **23**, further comprising:

a contact member disposed on the housing, the contact member configured to contact the photosensitive body.

25. The cleaning device of claim **20**, further comprising:

an elastic member disposed on the housing,

wherein the film member is disposed between the plate and the elastic member.

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